

Applicants: Sung-Kyu KANG et al.
Serial No.: 10/783,458
Filed: February 19, 2004
Page 7

REMARKS

Claims 1-9 were pending in this application. Claims 1, and 4-6, have been amended, and claims 2, 3, 7, and 9 have been cancelled. Accordingly, claims 1, 4-6, and 8 are presently being examined.

Page 2, paragraph 1 and 2, of the Office Action objected to the specification on page 14 in lines 16 and 21, and on page 15 in line 1. According to the Office Action, "conditioned coal" and "conditioned oil" are misdescriptive since a conditioning step for the coal and oil is not disclosed. The Office Action required correction.

Applicants hereinabove have amended the specification in the lines noted in the Office Action and also on page 15 in line 5 to correct a typographical error and describe "coal" and "oil" instead of "conditioned coal" and "conditioned oil". Support for these amendments can be found, inter alia, on page 14 in lines 3-9 of the subject specification. Accordingly, applicants respectfully submit that the cited sections of the subject specification, as amended, are not misdescriptive.

In view of the amendments to the specification and the remarks above, applicants respectfully request that the objection to the specification be reconsidered and withdrawn.

Page 2, paragraph 3 of the Office Action rejected claims 1-9 under 35 U.S.C. §112, second paragraph, as being indefinite. According to the Office Action: (1) in claim 1, the "screening step" was misdescriptive because the enlarged agglomerates do not pass through the sieve; (2) in claim 1, "them" is vague and

Applicants: Sung-Kyu KANG et al.
Serial No.: 10/783,458
Filed: February 19, 2004
Page 8

indefinite; and (3) in claims 3-6 the word "conditioned" used with the words "coal" and/or "oil" is vague and indefinite.

Applicants hereinabove have amended claim 1 to more clearly recite that "water with the dispersed unagglomerated inorganic residue" is passed "through a sieve" instead of the "enlarged sludge-coal-oil agglomerates". Support for this amendment can be found, inter alia, on page 17 in line 1 and in Fig. 2 of the subject specification.

Applicants have further amended claim 1 to more clearly recite that "the enlarged sludge-coal-oil agglomerates" are selectively separated from the "water with the dispersed unagglomerated inorganic residue" instead of using the pronoun "them". Support for this amendment can be found, inter alia, on page 17 in line 1 and Fig. 2 of the subject specification. Accordingly, applicants respectfully submit that claim 1, as amended, is not indefinite

In addition, applicants have amended claims 4-6, to correct a typographical error and more clearly recite "oil" and "coal" without the adjective "conditioned". Support for these amendments can be found, inter alia, on page 14 in lines 3-9 and in Fig. 2 of the subject specification. Also, since claims 4-6 and 8 depend on amended claim 1 and because a claim which depends on another claim is subject to all the limitations of that other claim, applicants respectfully submit that claims 1, 4-6, and 8, like amended claim 1, are not indefinite.

Furthermore, applicants have cancelled claims 2, 3, 7 and 9. Accordingly, applicants respectfully submit that the rejections of claims 2, 3, 7 and 9 are now moot.

Applicants: Sung-Kyu KANG et al.
Serial No.: 10/783,458
Filed: February 19, 2004
Page 9

In view the amendment to claims 1, and 4-6, and the cancellation of claims 2, 3, 7, and 9, applicants respectfully submit that amended claims 1, 4-6, and 8 are not indefinite, and respectfully request that the rejections of claim 1-9 under 35 U.S.C. §112, second paragraph, as being indefinite be reconsidered and withdrawn.

From page 2, paragraph 4 to page 3, paragraph 1, of the Office Action, claims 1-9 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 3,933,634 to Seki ("Seki patent") in view of U.S. Patent No. 5,051,487 to Bhattacharyya et al. ("Bhattacharyya patent") and U.S. Patent No. 4,874,393 to Mikhlin et al. ("Mikhlin patent"). According to the Office Action, the Seki patent discloses each element of the claims except for adding oil to the sludge and using a sieve to separate the agglomerates. However, the Office Action also states that adding oil to the sludge is disclosed by the Bhattacharyya patent and the use of sieve is disclosed by the Mikhlin patent. Accordingly, the Office Action concludes that one of skill in the art would obviously combine the teachings of these three patents to aid in dewatering sludge.

Applicants hereinabove have amended claim 1 to more clearly recite that: (1) "supplying oil and coal" results in the formation of "separated organic materials having a diameter of 500 μ m or higher"; (2) the agglomerates are enlarged "to the range of 0.5 mm to 3.0 mm" by stirring the agglomerates "at a low speed" after the agglomerating step; (3) "water with the dispersed unagglomerated inorganic residue" is selectively separated from "the enlarged sludge-coal-oil agglomerates"

Applicants: Sung-Kyu KANG et al.
Serial No.: 10/783,458
Filed: February 19, 2004
Page 10

through a sieve of "48 mesh or less"; and (4) after the selective separation from the "unagglomerated inorganic residue", the enlarged sludge-coal-oil agglomerates are spray-washed and dewatered. Support for these amendments can be found, inter alia, on page 14 in lines 10-15, on page 15 in lines 20-23, on page 15 in lines 13-19, and from page 15, line 23 to page 16, line 1, of the subject specification, respectively.

Applicants respectfully submit that the technology described in the subject application differs from the conventional mechanical dewatering methods of filter-press, vacuum-filtering, using centrifugal force. In the subject invention, organic materials are selectively purified and recovered from the suspension of hydrophilic inorganic materials and organic materials in sewage sludge. As recited in amended claim 1, the subject invention achieves this result at least because: (a) the sludge is conditioned in preparation by imparting hydrophobicity and lipophilicity to the sludge before agglomeration; and (b) the supply of oil and coal added to the sludge is controlled so that the oil acts a 'bridging agent' enabling the formation of sludge-coal-oil agglomerates of organic materials of certain sizes which are enlarged and separated from the mixture with a sieve.

Applicants respectfully submit that none of the three patents cited in the rejection under §103(a) teach or suggest the step of "conditioning sludge to impart hydrophobicity and lipophilicity" before the agglomerating step as recited in amended claim 1. Instead, the first step in the three patents begin with coal or oil (in the form of an oil and water

Applicants: Sung-Kyu KANG et al.
Serial No.: 10/783,458
Filed: February 19, 2004
Page 11

emulsion). Indeed, the Bhattacharyya patent, which treats wastes and sludges with terpolymers to deal with the "diversified character" of sludges and effect dewatering, see column 10 in lines 60-65 of the Bhattacharyya patent, supplies the terpolymers with an oil and water emulsion as a first step. In contrast, while the subject invention can employ terpolymers, the terpolymers act as a surface conditioner of the sewage sludge in order to improve the affinities (hydrophobicity and lipophilicity, see amended claim 1) between sludge and oil before the "agglomerating step". Accordingly for at least this reason, applicants respectfully submit that amended claim 1 is not anticipated by nor obvious over the three patents.

Furthermore, none of the three patents teach or suggest supplying oil and coal to form sludge-coal-oil agglomerates of "separated organic materials having a diameter of 500 μm or higher" as taught by the subject invention and as recited in amended claim 1. While the Seki patent supplies coal to separate solids from solid/liquid mixtures in the treatment of sewage sludge, so called 'dewatering', the subject invention goes further by supplying coal and oil to separate "organic materials" from such solids. In other words, while the Seki patent, like other conventional methods, may add coal as an organic flocculant, the subject application as recited in amended claim 1 uses such flocculants as 'bridging agents' to form sludge-coal-oil agglomerates of "organic materials having a diameter of 500 μm or higher". The subject invention achieves this result using the hydrophobicity of carbohydrates and, most importantly, the affinity of oil for bridging solid particles,

Applicants: Sung-Kyu KANG et al.
Serial No.: 10/783,458
Filed: February 19, 2004
Page 12

see page 12 in lines 1-6 and page 13 in lines 11-17 of the subject specification. Like the Seki patent, neither the Bhattacharyya patent nor the Mikhlin patent teach or suggest such separation of sludge-coal-oil agglomerates of organic materials from the conditioned sludge as taught by the subject invention and as recited in amended claim 1. Therefore, unlike the three patents, the subject method as recited in amended claim 1 performs both dewatering and physical separation of inorganic residue from sewage and coal by adding (blending) oil for selective co-agglomeration.

In addition, applicants respectfully submit that because none of the three patents are concerned with selectively purifying and recovering organic agglomerates from the suspension of hydrophilic inorganic materials and organic materials in sewage sludge, the three patents fail to teach or suggest, as recited in amended claim 1, enlarging such sludge-coal-oil agglomerates of organic materials with "low speed" stirring, passing the mixture through a sieve to "selectively separate" the enlarged agglomerates, and "spray-washing" the separated organic agglomerates. For example, the Mikhlin patent is concerned with multi-agitation for agglomeration of coal-oil and for size enlargement of coal-oil which does not contain the undesirable inorganic residue (including heavy metal ions) of sewage sludge. Accordingly, the Mikhlin patent does not teach or suggest a bridging agent adjusted for co-agglomeration of sludge-coal-oil. Similarly, the Seki patent and the Bhattacharyya patents which do deal with sewage sludge, but are concerned with dewatering and not the separation and

Applicants: Sung-Kyu KANG et al.
Serial No.: 10/783,458
Filed: February 19, 2004
Page 13

purification of the resulting agglomerates also do not teach or suggest a bridging agent adjusted for co-agglomeration of sludge-coal-oil.

In other words, the subject invention as recited in amended claim 1 provides an inventive improvement over coal-oil, sludge-oil, and sludge-coal dewatering, an issue with which none of the three patents were concerned. Thus, absent a teaching of a need to purify the organic agglomerates output from a dewatering process for sewage sludge from the inorganic residue, one of skill in the art would not be led to combine the teachings of the Seki patent, the Bhattacharyya patent and/or the Mikhlin patent to achieve the result of the subject invention as recited in amended claim 1. Indeed, the Mikhlin patent teaches selectively recovering combustibles from waste water at coal sites, such as mines, not from sewage, and neither the Seki patent nor the Bhattacharyya patent appear to recognize the need to separate the inorganic materials from the organic agglomerates, but only to dewater. Therefore, absent the teaching of the subject invention as recited in amended claim 1, applicants respectfully submit that none of the three patents teach or suggest the benefit of dewatering and separating inorganic residue from organic materials in the sludge in the same process by supplying oil and coal to the sludge in a simultaneous or sequential manner according to the bridging characteristics between the sludge and oil as taught by the subject application on page 14 in lines 3-6 of the subject specification and as recited in amended claim 1. Accordingly, applicants respectfully submit that amended claim 1 is not

Applicants: Sung-Kyu KANG et al.
Serial No.: 10/783,458
Filed: February 19, 2004
Page 14

anticipated by, nor obvious over, the Seki patent in view of the Bhattacharyya patent and/or the Mikhlin patent for at least these reasons.

Claims 4-6 and 8 depend on amended claim 1, and because a claim which depends on another claim is subject to all the limitations of that other claim, applicants respectfully submit that claims 4-6, and 8, as amended, are not anticipated by nor obvious over the three patents for at least the reasons discussed above with respect to amended claim 1.

In view of the amendments to the specification, the amendment of claims 1, and 4-6, and the cancellation of claims 2, 3, 7, and 9, applicants respectfully request that the objections and rejections in the Office Action be reconsidered and withdrawn, and earnestly solicit a Notice Of Allowance.


If a telephone interview would be of assistance in advancing prosecution of the subject application, applicants' undersigned attorney invites the Examiner to telephone him at the number provided below.

Applicants: Sung-Kyu KANG et al.
Serial No.: 10/783,458
Filed: February 19, 2004
Page 15


No fees are deemed necessary in connection with the filing of this Amendment. However, if any such fees are required, authorization is hereby given to charge the amount of any such fees to Deposit Account No. 03-3125.

Respectfully submitted,

I hereby certify that this paper is being deposited this date with the U.S. Postal Service as first class mail addressed to:
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450


Richard S. Milner
Reg. No. 33,970

19 December 2005
Date


Richard S. Milner
Registration No. 33,970
Attorney for Applicants
Cooper & Dunham LLP
1185 Avenue of the Americas
New York, New York 10036
(212) 278-0400